CONSUMPTION OF FRESH ALFALFA HAY BY MULE DEER AND ELK[1]

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ABSTRACT.—Tame mule deer and elk were fed fresh alfalfa hay at night and given various alternate forages during the day. This schedule, simulating farmland depredation feeding, yielded consumption values for field-growing alfalfa hay.

Depredation of standing alfalfa by big game was recognized as a problem before 1930 when deer began using summer fields in southern Utah. Use of winter haystacks in northern and central Utah was first recorded about 1930 (Low 1955). To ameliorate at least part of the problem, the Utah Division of Wildlife Resources (UDWR), formerly the Utah Fish and Game Department, began providing materials and/or building fences around highly impacted winter haystacks.

As big game populations increased, so also did the depredation problem. In 1947 the legislature passed Utah's first wildlife damage law. This legislation was designed to reduce the economic losses incurred to farmers and permitted UDWR to pay for big game depredation losses up to a maximum payment of $100 per year per landowner. More importantly, however, the law clearly indicated that the state of Utah, through UDWR, accepted at least part of the responsibility for depredation losses. The maximum payment was increased to $200 in 1953 and abruptly raised to $2,000 in 1977. An amendment considered in 1979, but which failed to pass, would have eliminated the maximum payment clause, required UDWR to pay for actual values lost, and given the total financial responsibility for depredation losses to UDWR once damage claims were filed.

Before 1977 alfalfa depredation costs paid by UDWR were minor with most years after 1956 having less than 10 claims and total payments less than $2,000. Since 1977 payments as well as fencing costs have risen dramatically with costs paid to farmers for summer field-growing alfalfa hay exceeding $29,000 in fiscal year 1984–85.

In Utah wire baskets to determine depredation loss of field-growing alfalfa hay have been utilized since 1953. To determine losses, paired plots (basketed and unprotected) were established as soon as possible following depredation complaints and hand clipped just prior to field cutting (Pederson 1982). Although the basket technique is widely used (Tebaldi and Anderson 1982), it has several difficulties. The time requirement to establish, clip, and remove plots is very great, and the consistency of clipping and removing of materials is questionable. Furthermore, the number of plots used is usually few, and data on the number of plots required for a statistically sound sample are largely unavailable. Nonetheless, Pederson (1982) recommended the use of one basket per 10 acres but added confidence intervals were wide. Palmer et al. (1982) used a density of one basket per 0.74 acres.

An alternative method of determining depredation loss is the counting of depredating animals and assuming a consumption rate. Although this method has been used successfully, a major difficulty has been estimating the amount of hay consumed, particularly when rangeland forages are also consumed. In this report, data are presented for field alfalfa consumed under varying conditions by mule deer and elk.

METHODS

Six tame adult mule deer, two bucks and four does, and four adult tame elk, one mature castrated bull and three cows, were fed alfalfa hay in summer to determine consumption. Deer and elk were kept separate, with each

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group collectively maintained in pens measuring about 25 x 40 m. In each trial animals were given access to fresh alfalfa hay for three consecutive nights. Hay, exceeding observed consumption, was cut and weighed each evening with orts weighed the following morning. Samples of both fresh hay and orts were collected daily for converting to dry weight consumption. A minimum of one day separated each trial.

Three treatments were imposed and replicated three times in a random block design. In treatment 1 no other feeds were available to deer or elk. In treatment 2 lamb-grower pellets were offered to deer in excess of consumption while elk were given access to about 12 ha of dryland, grass pasture. In treatment 3, in addition to the feeds available in treatment 2, both deer and elk were given daily a variety of common browse and forb forages in excess of consumption. These forages included quaking aspen (*Populus tremuloides*), common chokecherry (*Prunus virginiana*), willow (*Salix spp.*), Saskatoon serviceberry (*Amelanchier alnifolia*), Rocky Mountain maple (*Acer glabrum*), mountain snowberry (*symphoricarpos oreophilus*), mulesear wyethia (*Wyethia amplexicaulis*), Fremont geranium (*Geranium fremontii*), and minor amounts of several other species.

In addition to the pen trials, five deer, one buck and four does, were taken to a mountain enclosure containing 2.4 ha. The enclosure described by Smith et al. (1979) was dominated by big sagebrush (*Artemisia tridentata*) and antelope bitterbrush (*Purshia tridentata*) with smaller amounts of several other shrubs and a large variety of grasses and forbs in the understory. Alfalfa hay was fed as described above with no supplements during the first three consecutive trial periods. Pellets were offered in excess of consumption during the next three trials when preferred forages of low abundance had been largely consumed.

Following feeding trials, deer and elk weights were obtained. Forage and orts samples were dried at 55 C for 24 hours and weighed.

Results and Discussion

In general, daily consumption of alfalfa varied according to the alternate foods available (Table 1). As expected, consumption of alfalfa hay decreased as alternate feeds were increased for both deer and elk. Thus, when no other feeds were available, alfalfa consumption was highest; it was lowest when browse plus pellets or pasture were available. Hay consumption also increased as the summer progressed. This was due to increases in metabolic rate and physical condition of animals (Moen 1978).

Consumption of alfalfa hay when based on an intake rate per unit of body weight was determined to be very similar between deer and elk (Table 1). In treatment 1, where no other feeds were available, deer and elk averaged an intake of 1.49 kg/100 kg. Since the alternate feeds in treatments 2 and 3 were not the same for deer and elk, direct comparisons are difficult to interpret. However, in treatment 3 both deer and elk had several alternate feeds available in excess of consumption, with

TABLE 1. Daily consumption of fresh alfalfa hay by mule deer and elk during summer 1985 (kg oven-dry hay/100 kg live animal).

A. Deer consumption in a small enclosure

	Treatments		
	1	2	3
Beginning date	None	Pellets	Browse and pellets
7-1-85	1.22[a(1)]	0.91[b]	0.87[c]
7-13-85	1.48[bc(2)]	1.15[d]	0.93[(3)]
7-25-85	1.78[abcde]	1.57	0.97[e]
Mean	1.49[f]	1.21	0.92[f]

B. Elk consumption in a small enclosure

	Treatments		
	1	2	3
Beginning date	None	Dry pasture	Browse and dry pasture
6-17-85	1.41	0.98[ab]	0.91[e]
7-3-85	1.43[a]	1.06[d]	1.11[e]
7-15-85	1.63[bcde]	1.39	1.15
Mean	1.49[f]	1.14	1.06[f]

C. Deer consumption in a mountain enclosure

Beginning date	All forages	Beginning date	Pellets and all forages
8-15-85	0.92	8-24-85	0.73[abcd]
8-18-85	1.12[a]	8-27-85	1.00[e]
8-21-85	1.33[b]	8-30-85	0.97[d]
	1.12		0.90

(1)Figures followed by a common letter are significantly different ($P < .05$).
(2)Figure based on two days feeding.
(3)Figure based on four days feeding.

deer averaging an alfalfa intake of 0.92 kg/100 kg and elk 1.06 kg/100 kg. The decrease of consumption in alfalfa hay from treatment 1, with no other feeds, to treatment 3, with several other feeds, was 38% for deer and 29% for elk.

The feeding trials for deer in the mountain enclosure yielded additional valuable comparisons and support of the pen data. Over the six enclosure trials with rangeland forages available deer averaged 1.01 kg/100 kg of alfalfa hay consumption compared to 0.97 kg/100 kg in the last comparable pen trial. The increase in alfalfa hay consumption over time for the first three enclosure trials was probably due to preferred forage depletion within the enclosure. As preferred forages became exhausted, alfalfa hay consumption increased. Austin et al. (1984), working on similar rangeland, showed highly preferred forages in low abundance were rapidly depleted even though other preferred forages were abundant. The small change in alfalfa consumption between the final two trials suggested preferred forages of low abundance were depleted and deer diets were static.

In other research Tevaldi and Anderson (1982) determined, using fecal materials, that alfalfa comprised only 30% of diets from deer using alfalfa fields. However, they opted to recommend using 50% dietary contribution because of additional losses to trampling and bedding, and the more complete digestion of green alfalfa hay as compared to shrubby species (Anthony and Smith 1974). Applying Alldredge et al. (1974) consumption rates, Tebaldi and Anderson (1982) produced consumption rates of 0.63 and 1.05 kg/100 kg at 30% and 50% diet contribution, respectively, the latter figure being very comparable to our data.

The data presented in Table 1 establish outside boundaries for depredation determination of field-growing alfalfa. Because rangeland situations are highly variable, animals will have access to greatly different range and forage conditions during the day when away from alfalfa fields. Consequently, we recommend evaluating the daytime rangeland used by depredating animals and adopting or interpolating a consumption value.

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